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Why does competitive psychological climate foster or hamper career success? The role of challenge and hindrance pathways and leader-member-exchange☆

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ABSTRACT

This study integrated research on competitive psychological climate (CPC) and successful career development within transactional stress theory and the job-demands resources model. The theoretical model assumed two different processes from CPC at work that might either foster or hamper career success. Specifically, CPC might be positively related to work engagement (motivation-enhancing path, CPC appraised as challenge) or burnout (energy-decreasing path, CPC appraised as hindrance), which then should be positively or negatively related to objective and subjective career success, respectively. High versus low leader-member exchange relationships are assumed to moderate the relationships between CPC and work engagement and burnout. In Study 1, we tested the theoretical model within a sample of 808 academic scientists from different research fields in Germany. By doing so, we applied conditional indirect effects analyses within a path-modeling framework. The results largely supported the theoretical model, and showed that CPC is positively related to the number of publications and career satisfaction via work engagement under the condition of a high LMX quality. By contrast, CPC was negatively related to career satisfaction via burnout under the condition of a low LMX quality. Within Study 2 and an additional independent sample, results showed that these pathways are explained via hindrance and challenge appraisals of CPC. We discuss these results against the background of competition-based HR systems, as well as the integration of challenge–hindrance frameworks in career developmental research.

High levels of competition at work represent one aspect of changing labor markets, organizations, and career systems. Consequently, individuals are confronted with this competition and related perceptions (i.e., competitive psychological climate) in their career development (e.g., Connelly, Tihanyi, Crook, & Gangloff, 2014; Fletcher, Major, & Davis, 2008; Spurk, Keller, & Hirschi, 2019). Against this background, researchers have begun to predict career success outcomes by competition related variables, like competitive psychological climate (e.g., Spurk et al., 2019b) or organizational culture (O'Neill & O'Reilly, 2010), with the aim to provide competition related knowledge that can be used for career developmental programs and individual career management. Scholars and practitioners typically view the role of (perceived) competition in the workplace in two ways. The first perspective — which we call in

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the tradition of the job demand-resource (JD-R) model (Bakker & Demerouti, 2017; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) motivation-enhancing — states that (perceived) competition in the workplace can enhance individual motivation and organizational outcomes, such as job performance, and ultimately increase career success because of challenging social comparison and goal setting processes (Fletcher et al., 2008; Jones, Davis, & Thomas, 2017; O'Neill & O'Reilly, 2010). The second perspective — which we call in the tradition of the JD-R model energy-decreasing — states that (perceived) competition per se is unhealthy (Kohn, 1999). This perspective contends that competition is stressful, evokes uncertainty, decreases job performance (Fletcher et al., 2008), and ultimately decreases career success (Spurk et al., 2019b).

Focusing only on one of these two perspectives when predicting career success seems to be too simplistic given that both perspectives have received support in previous research on competitive climates, and that career development per se has become complex and uncertain (Hall, Yip, & Doiron, 2018). However, to our knowledge, no study to date has investigated under which conditions either one or both of these competing perspectives emerge. Furthermore, although there are recent calls to systematically compare competing perspectives when predicting career success (Spurk, Hirschi, & Dries, 2019), only a few studies have provided insightful results of such comparisons (Judge, Kammeyer-Mueller, & Bretz, 2004; Kirchmeyer, 2005).

Therefore, based on transactional stress theory (Folkman, Lazarus, Gruen, & DeLongis, 1986; Lazarus & Folkman, 1984) and the JD-R model (Bakker & Demerouti, 2017; Demerouti et al., 2001), the general aim of this study was to investigate two different processes from competitive psychological climate (CPC) at work, which might either foster or hamper career success. Specifically, CPC might be positively related to work engagement (motivation-enhancing path, CPC appraised as challenge) or burnout (energy-decreasing path, CPC appraised as hindrance), which then should be positively or negatively related to objective and subjective career success, respectively.

Furthermore, we assume that the different processes and the underlying interpretations (challenge versus hindrance) depend upon other contextual workplace resources. Specifically, we decided to investigate a high versus low leader-member exchange (LMX) quality relationship as a potential moderator because it can be seen as a critical condition for having, or not having, diverse and impactful resources (Dulebohn, Bommer, Liden, Brouer, & Ferris, 2012; Graen & Uhl-Bien, 1995), and whereby might also affect stress-related processes (Chen & Fang, 2019; Montani, Courcy, & Vandenberghe, 2017; Ozer, Chang, & Schaubroeck, 2014). Hence, LMX can be positioned as a central contextual workplace resource within the JDR-model (Loi, Ngo, Zhang, & Lau, 2011). For example, it has been shown that employees with good LMX relationships experience higher levels of organizational commitment and perceived justice (Rockstuhl, Dulebohn, Ang, & Shore, 2012), and lower levels of role ambiguity and conflict (Dulebohn et al., 2012). Furthermore, as LMX is a shapeable contextual factor (van den Heuvel, Demerouti, & Peeters, 2015), selecting LMX as a potential moderating factor is not only theoretically relevant but also practically useful. We assume that at high LMX levels, the indirect effect of CPC on career success should be positive via higher levels of work engagement, since CPC is interpreted as a challenge under such conditions. In contrast, at low LMX levels, the indirect effect of CPC on career success should be negative via higher levels of burnout, since CPC is interpreted as a hindrance under such conditions (see Fig. 1 for the whole model).

Altogether, this study contributes to knowledge about how (a) CPC in the workplace can be integrated within theoretical frameworks of transactional stress theory and the JD-R model, (b) different competing theoretical perspectives (i.e., motivation-enhancing versus energy-decreasing) from CPC research relate to each other in the prediction of career success, whereby extending research on predictors of career success, and (c) specific boundary conditions (i.e., contextual resources) are responsible for positive or negative effects of CPC and when CPC is interpreted as challenging or hindering. Finally, by applying transactional stress theory and related assumption about challenge and hindrance appraisals as potential explaining mechanisms, the present study also extends past and recent research about appraisals of different stressors at the workplace (e.g., Horan, Nakahara, DiStaso, & Jex, 2020; Kim & Beehr,

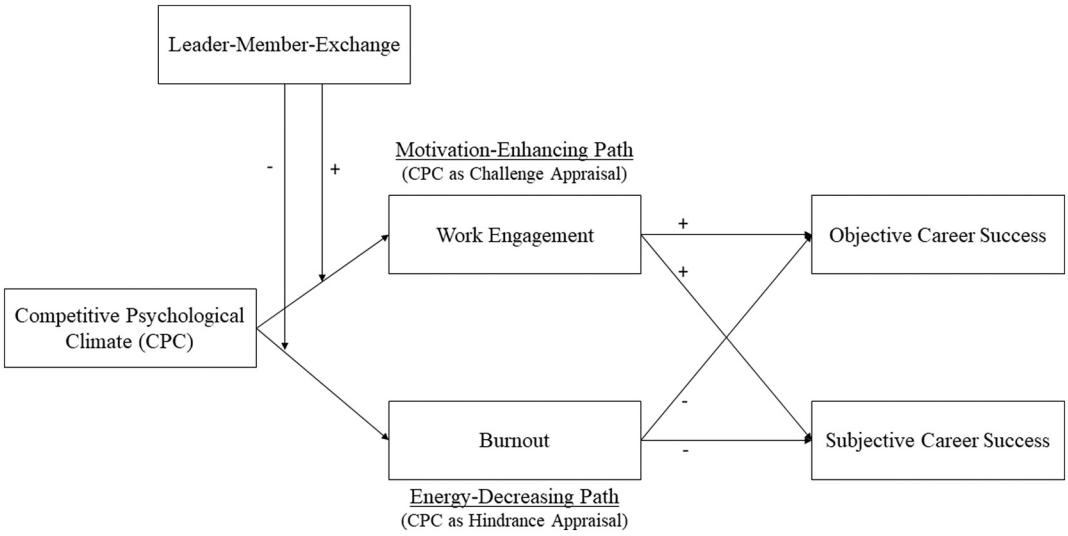

Fig. 1. Theoretical moderated dual process model from competitive psychological climate (CPC) to career success.

2020; Kronenwett & Rigotti, 2020; Liu & Li, 2018). In fact, a recent review calls for more research about appraisals instead of a priori classified stressors because those appraisals are more in line with underlying assumptions of transactional stress theory (Horan et al., 2020).

To reach these aims and contributions, we tested the model from Fig. 1 across two points in time within a large sample of young scientists working in different fields at different universities and research institutes in Germany (Study 1). Furthermore, to provide additional evidence for the underlying assumptions about challenge and hindrance appraisals from transactional stress theory, we collected further independent data on challenge and hindrance appraisals from academic employees from Germany (Study 2).

1. Study 1

1.1. Competitive psychological climate and career success

Psychological climates are built upon the objective work environment (James, Hartman, Stebbins, & Jones, 1977; Parker et al., 2003), and are positively related to aggregated climates (Fletcher et al., 2008; Parker et al., 2003). *Competitive psychological climate* is a one-dimensional individual-level construct comprised of psychologically meaningful evaluations of competition-related proximal organizational events, structures, and processes (Brown, Cron, & Slocum, 1998; James, Hater, Gent, & Bruni, 1978; Rousseau, 1988). More specifically, CPC is defined as "the degree to which employees perceive organizational rewards to be contingent on comparisons of their performance against that of their peers" (Brown et al., 1998, p. 89). For instance, performance evaluations based on comparisons with others, perceived competition with others, and frequent status comparisons within the social environment, such as coworkers or supervisors, are the main drivers for CPC (Fletcher et al., 2008). Moreover, CPC can be seen as a stressor because perceived competition can lead to uncertainty. In a competitive situation, even if an individual performs at an objectively measured high level, he or she may not "win" (Fletcher et al., 2008). Moreover, within sports research, competitiveness within the team is conceptualized as a stressor (Mellalieu, Neil, Hanton, & Fletcher, 2009).

There are only few studies that provide knowledge about potential predictors of CPC. For example, studies showed that feelings of envy, being envied (due to perceiving or receiving i-deals) (Ng, 2017) or economic inequality (Sánchez-Rodríguez, Willis, Jetten, & Rodríguez-Bailón, 2019) is positively related to CPC. A proving goal orientation seems to be stronger positively related to CPC than a learning goal orientation (Jones et al., 2017). Furthermore, trait competitiveness (a stable disposition toward enjoying competition) is positively related to CPC (Fletcher et al., 2008), suggesting that CPC is partly driven by a dispositional basis.

Regarding outcomes, CPC was positively related to perceived job stress (Fletcher et al., 2008), suggesting that CPC can indeed be seen as job-related stressor or demand. Further research showed that, on average, CPC is either insignificantly, or weakly, related to different workplace outcomes. On the one hand, individuals with higher CPC tend to work slightly longer hours and show slightly higher levels of workaholism compared to individuals with lower CPC. On the other hand, CPC was unrelated to job satisfaction, job performance, organizational commitment, and job dedication (Fletcher et al., 2008) as well as work engagement (Jones et al., 2017). To the best of our knowledge, no study about CPC and burnout within employee workplace settings exists to date. Overall, the relatively small or not statistically significant relationships with the here described outcomes could be explained by the potential existence of two different competing mechanisms (i.e., motivation-enhancing versus energy-decreasing), leading to opposite effects of CPC on workplace outcomes (Fletcher et al., 2008).

Career success is defined as the accomplishment of desirable work-related outcomes at any point in a person's work experience over time (Arthur, Khapova, & Wilderom, 2005). The distinction between objective and subjective career success has received much attention in the literature (Gunz & Heslin, 2005; Spurk et al., 2019a). Objective career success is defined as being directly observable by others and measurable in a standardized way — typically by weighing a person's career against societal norms concerning salary or promotion history (Dries, Pepermans, Hofmans, & Rypens, 2009) — and specific achievements relevant for the respective occupation or career track (Dries, Pepermans, & Carlier, 2008; Gunz & Mayrhofer, 2011). Within scientific careers, the number of publications can be seen as one indicator of objective career success (Baruch, Dany, Pralong, & Davense, 2014; Zacher, Rudolph, Todorovic, & Ammann, 2019). Subjective career success is a focal career actor's evaluation and experience of achieving meaningful career outcomes (Ng, Eby, Sorensen, & Feldman, 2005; Shockley, Ureksoy, Rodopman, Poteat, & Dullaghan, 2016). Subjective career success is often operationalized through career satisfaction (Greenhaus, Parasuraman, & Wormley, 1990; Seibert, Kraimer, Holtom, & Pierotti, 2013), as an indicator of an individual's general evaluation about different aspects of career progress (e.g., advancement and career goals; Spurk, Abele, & Volmer, 2015).

A recent study showed that CPC shows small positive relationships with objective and subjective career success (Spurk et al., 2019b). Moreover, these relationships were stronger under conditions of high trait competitiveness, whereas they were nonexistent under conditions of low trait competitiveness (Spurk et al., 2019b). These findings again suggest the potential existence of two different competing mechanisms (i.e., motivation-enhancing versus energy-decreasing), leading to opposite effects of CPC on career success. Against this background, we do not expect meaningful bivariate relationships between CPC and objective and subjective career success, but assume that the opposite positive or negative relationships can be explained by different processes that occur under specific conditions. We will explain these moderated indirect effect assumptions in more detail in the next sections.

1.2. A dual process model from cpc to objective and subjective career success transactional stress theory—CPC as stressor related to challenge and hindrance appraisals

Transactional stress theory argues that environmental conditions (termed stressors) are not the direct cause of a stress reaction, but

rather it is the person's appraisal of a challenge or hindrance that proceeds the response (Kohler Giancola, Grawitch, & Borchert, 2009; Lazarus & Folkman, 1984; Storch, Gaab, Küttel, Stüssi, & Fend, 2007). This theory places cognitive processes at the center of the stress experiences, and it argues that stressors can be interpreted differently, depending on how a person evaluates the meaning and significance of a situation. Interestingly, challenge–hindrance appraisal frameworks also highlight situations closely related to competition. For example, if a situation is perceived as having the potential for personal rewards (e.g., recognition and praise), mastery, and growth, individuals tend to develop challenge appraisals (Webster, Beehr, & Love, 2011). On the contrary, if stressors are perceived as primarily having the potential to threaten one's well-being by hindering the attainment of goals and personal development, they are linked to hindrance appraisals (Lazarus & Folkman, 1984; Skinner & Brewer, 2002).

Most research within vocational and organizational psychology has investigated challenge versus hindrance stressors (Crawford, LePine, & Rich, 2010; Webster & Adams, 2020), and did not investigate related appraisals (Horan et al., 2020; Webster & Adams, 2020). Challenge stressors have been shown to be positively related to job satisfaction, work self-efficacy (Webster, Beehr, & Christiansen, 2010), positive coping expectancy, positive emotions (Skinner & Brewer, 2002), and motivation and job performance (LePine, Podsakoff, & LePine, 2005). Conversely, hindrance stressors have been shown to predict higher burnout (Webster et al., 2011), lower well-being (Skinner & Brewer, 2002), higher turnover intentions (Webster et al., 2011), and lower levels of motivation and job performance (LePine et al., 2005). Importantly, on the appraisals level, previous research has assumed that hindrance appraisals are positively related with strain (e.g., burnout; Webster et al., 2011) and that challenge appraisals are positively related with motivation (Skinner & Brewer, 2002), like, for instance, work engagement.

We propose that the initially mentioned two perspectives on individual reactions to CPC can be integrated into the theoretical framework of challenge and hindrance appraisals. Against the background of transactional stress theory, the perspective that CPC in the workplace can enhance individual motivation and organizational outcomes, such as job performance, and ultimately increase career success, can be explained by individual challenge appraisals. In that sense, some individuals interpret their experience of competition (i.e., the stressor) as a challenge, with a potential positive outcome in terms of recognition, prestige, and personal development. On the contrary, the perspective that competition per se is unhealthy, evokes uncertainty, and fosters negative types of work commitments, can be explained by individual hindrance appraisals as an interpretation of the stressor. In that sense, other individuals interpret their experience of competition at the workplace (i.e., the stressor) as a hindrance, with a potentially negative outcome in terms of a potential loss of recognition, unsuccessful coping, and lower rewards.

Such different assumptions (e.g., that one stressor can have opposite effects on the same outcome, here career success) have been mentioned within transactional stress theory (Horan et al., 2020; Lazarus & Folkman, 1984; Skinner & Brewer, 2002). Specifically, the nature of the outcome (i.e., positive: higher success versus negative: lower success) is dependent of other factors that affect the nature of the appraisal outcome. In this tradition, Webster et al. (2011) showed that role conflict (hindrance stressor), role ambiguity (hindrance stressor), and workload (challenge stressor) were positively related to both challenge and hindrance appraisals. However, this study did not investigate potential moderators that determine under which conditions those appraisals occur more or less. Skinner and Brewer (2002) showed that a stressful achievement event can result in positive emotions for some individuals, and in negative emotions for others, depending on the individual appraisal style. Applied to the current study, those results suggest that moderating factors might play a role in whether the motivation-enhancing or the energy-decreasing route of CPC is processed and finally results in career success.

1.3. CPC appraised as a challenge under conditions of high LMX: the motivation-enhancing path to higher levels of career success via work engagement

Work engagement is a positive, fulfilling, affective motivational state of work-related well-being that is characterized by vigor, dedication, and absorption (Bakker, Schaufeli, Leiter, & Taris, 2008). Work engagement is thereby different from related concepts, such as workaholism (Schaufeli, Taris, & van Rhenen, 2008), organizational commitment (Bakker et al., 2008), or the absence of burnout (Schaufeli et al., 2008). Work engagement is mostly related to positive individual and organizational outcomes, such as job satisfaction and job performance, and less turnover intentions (Halbesleben, 2010). Moreover, work engagement has been shown to be positively related to subjective career success (Ng & Feldman, 2014b; Vincent-Höper, Muser, & Janneck, 2012) and is usually seen as one variable representing the motivation-enhancing perspective within the JD-R model (Bakker & Demerouti, 2017; Demerouti et al., 2001). Importantly, one study showed that challenge appraisals related to the stressors of time urgency, role conflict, and emotional demands were positively related to work engagement (Li, Taris, & Peeters, 2020).

LMX emerged as a powerful predictor for a wide range of outcome variables (Gooty & Yammarino, 2016; Martin, Guillaume, Thomas, Lee, & Epitropaki, 2016). LMX theory focuses on the separate dyadic relationships between leaders and each of their followers and assumes that leaders do not develop the same type of relationship with each follower (Blau, 1964; Cropanzano & Mitchell, 2005; Dulebohn et al., 2012). Low LMX quality relationships are characterized by an economic exchange on formally agreed, immediate, and balanced reciprocation of tangible assets, such as employment contracts focusing on pay for performance. High LMX quality relationships are characterized by increasingly engendered feelings of mutual obligation and reciprocity, which render such relationships more social in nature, which is accompanied by loyalty, commitment, support, and trust (Dulebohn et al., 2012).

Within our research context, with high LMX, supervisors facilitate workers' career potential and provide them with further benefits that are helpful for further development of their competencies. Within the JD-R model, high LMX can be seen as a contextual resource because the provided benefits (e.g., rich communication, increased support, and more attractive work roles) that are given to employees in high LMX quality relationships boost their existing resources (Gerstner & Day, 1997; Harris, Wheeler, & Kacmar, 2011). On the contrary, workers with low LMX quality usually have less access to information, fewer material resources, and less attractive work

tasks.

Following the above introduced line of thought from transactional stress theory and the JD-R model, it is conceivable that high LMX quality has an influence on the individual appraisal of CPC. In particular, individuals with high LMX quality should interpret CPC as challenging because they are receiving enough and high-quality resources to expect to be able to deal with the competitive environment. In other words, we expect that CPC enhances motivation in terms of work engagement if individuals receive the necessary resources to benefit from competition. Such reasoning is in line with theoretical assumptions from the JD-R model that a resource (here high LMX) is beneficial in terms of strengthening the positive relationships of challenging and motivational factors (here CPC appraised as challenge) with positive outcomes like work engagement. Empirically, moderation assumptions on the effects of CPC in other contexts were supported by the study of Fletcher et al. (2008), which showed that CPC is positively related to job dedication and negatively related to job stress under conditions of high trait competitiveness (but not under conditions of low trait competitiveness). Furthermore, Jones et al. (2017) found that CPC was only positively related to work engagement under conditions of high learning and proving goal orientations. Regarding stress-related research, for example, Montani et al. (2017) showed that if LMX was high, the positive effects of role overload (challenge stressor) on innovation were enhanced. To the best of our knowledge, no study about the moderation effects of LMX on appraisals exists to date.

Finally, the contest-mobility perspective of attaining career success assumes that individuals can compete for success, highlighting that substantial differences in getting ahead in one's career is motivation that puts one in advantage compared to other individuals with lower motivation (Ng et al., 2005; Spurk et al., 2019a; Turner, 1960). Within the contest mobility perspective, personal and motivational variables are seen as proximal to career success. For example, it has been shown that motivational variables like intrinsic job motivation or work commitment are positively related to career success (Ng & Feldman, 2014a). Based on this logic, we assume that work engagement as motivational and proximal variable, in turn, will be positively related to both objective and subjective career success, because higher levels of motivation put such individuals at an advantage while contesting for career success. In sum, we derive the following hypotheses regarding the motivation-enhancing perspective:

Hypothesis 1. CPC is positively related to objective career success via work engagement under conditions of high LMX.

Hypothesis 2. CPC is positively related to subjective career success via work engagement under conditions of high LMX.

1.4. CPC appraised as hindrance under the condition of low LMX: the energy-decreasing path to lower levels of career success via burnout

Burnout can be defined as a state of exhaustion, disengagement from work, and a lowered sense of effectiveness as a professional (Demerouti et al., 2001; Maslach, Jackson, Leiter, Schaufeli, & Schwab, 1986). Previous research identified two core dimensions of burnout: exhaustion and disengagement from work (Demerouti, Bakker, & Leiter, 2014). Burnout is usually seen as one variable representing the energy-decreasing perspective within the JD-R model (Bakker & Demerouti, 2017; Demerouti et al., 2001).

Exhaustion is defined as a consequence of intense physical, affective, and cognitive strain (e.g., as a consequence of prolonged exposure to certain job demands; Schaufeli & Bakker, 2004). Disengagement refers to distancing oneself from one's work in general, work objects, and work content (e.g., uninteresting, no longer challenging, but also "disgusting"; Demerouti & Bakker, 2008). Previous research has shown that burnout and the related energy loss can be explained by the experience of hindrance stressors (Crawford et al., 2010) and importantly also hindrance appraisals. For example, one study showed that hindrance appraisals of time urgency, role conflict, and emotional demands were positively related to burnout (Li et al., 2020).

Following the abovementioned line of thought from transactional stress theory and the JD-R model, it might be that low LMX quality also has an influence on the individual appraisal of CPC. However, in contrast to high LMX quality, individuals with a low LMX quality should appraise the perceived competition as hindering. Such reasoning is in line with theoretical assumptions from the JD-R model that a lack of resources (here low LMX) is maladaptive in terms of strengthening the positive relationships of hindering and energy-decreasing factors (here CPC appraised as hindrance) with unfavorable outcomes like burnout. More specifically, this is because individuals with low LMX lack important resources (e.g., psychosocial support, instrumental support, and challenging tasks) and therefore expect to unsuccessfully cope with the competitive environment. Experiencing CPC as hindering results in higher levels of unhealthy strain, which have been shown to result in higher burnout levels (Crawford et al., 2010; Schaufeli & Bakker, 2004). In other words, we expect that CPC is negatively related to an individual's energy level (in terms of exhaustion and disengagement) if they do not receive the necessary resources, and thus expect harmful outcomes from the perceived competition.

Similarly as above, based on assumptions of the contest-mobility perspective of career success (Ng et al., 2005; Spurk et al., 2019a; Turner, 1960), we assume that burnout, in turn, will be negatively related to both objective and subjective career success because a lack of energy puts individuals at a disadvantage while contesting for career success. For example, it has been shown that energy-related variables like low positive affectivity or low work centrality, which are related to burnout, are negatively related to career success (Ng & Feldman, 2014a). In other words, individuals with higher burnout levels might not walk the extra-mile that is sometimes needed to contest against others to attain career success. Moroever, within the contest-mobility perspective, burnout is a more proximal variable to career success making it a suitable explaining variable why CPC relates to career success. In sum, we derive the following hypotheses regarding the energy-decreasing perspective:

Hypothesis 3. CPC is negatively related to objective career success via burnout under conditions of low LMX.

Hypothesis 4. CPC is negatively related to subjective career success via burnout under conditions of low LMX.

1.5. Method

1.5.1. Sample and procedure

The sample consisted of German academic scientists (PhD candidates and postdocs), who took part in a time-lagged online survey at two points of time (two-year intervals from 2015 to 2017). PhD candidates at German universities are mostly employed as regular staff members on fixed-term contracts (e.g., for the duration of a project, or to a maximum of six years federal employment). Therefore, they are mostly exposed to some degree of integration in teaching and administrative tasks, besides their base research. Postdocs are also mostly employed on fixed-term contracts until they reach an associate/full professorship or assistant professorship with a tenure track.

At T1, 808 individuals participated, at T2, 439 stayed in the survey (response rate 54%). Individuals who participated at both time points did not differ by CPC, LMX, work engagement, gender, doctoral degree, contractual working hours/week, and occupational tenure in years at T1, from participants who participated only at T1. The two groups showed significant differences in burnout (T1 and T2: $M = 2.87$, $SD = 0.72$; only T1: $M = 3.04$ $SD = 0.74$; $t(665) = 2.86$, $p < 0.01$, $d = |0.23|$) and grade point average of university studies (T1 and T2: $M = 1.40$, $SD = 0.35$; only T1: $M = 1.46$, $SD = 0.42$; $t(776) = 2.18$, $p < 0.05$, $d = |0.16|$; German grade system: 1 = excellent, 5 = failed). Because we applied a full-information maximum likelihood estimation (FIML) to address missing data (Graham & Coffman, 2012), the final sample comprised 808 participants. We applied FIML because it was discussed as the best available option for modeling missing data. Other approaches, such as listwise, or pairwise, deletion require even more strict assumptions of missing completely at random (MCAR), and have been shown to result in less trustworthy parameter estimates compared to listwise or pairwise deletion (Enders & Bandalos, 2001; Little & Rubin, 2019; Schafer & Graham, 2002).

Within the final sample (55.9% female, 44.1% male; age: $M = 33.71$, $SD = 4.53$), 502 (62.1%) participants had finished their PhD at T1. Regarding their fields of research, 4.3% worked within mathematics, 4.9% within information technology, 24.5% within natural sciences, 14.4% within technical sciences, 32.4% within social sciences, 8.8% within humanities, 8.2% within economics, and 2.4% within other fields of research. Regarding their contracts, 84.7% worked on fixed-term contracts with a mean duration of 29.4 months ($SD = 16.42$), and 15.3% persons held open-ended contracts at T1. The mean occupational tenure of the participants at T1 was 5.74 years ($SD = 3.78$).

1.5.2. Measures

All variables despite objective career success were measured by means of a standardized questionnaire. Measures used a 6-point rating scale ranging from 1 = *totally disagree* to 6 = *totally agree*. We measured the predictor variable, the two mediators, the moderator, and controls at T1, and the two career success outcomes at T2. A time lag of two years is suitable to investigate the effects of specific predictor variables on career success (Seibert, Kraimer, & Crant, 2001; Spurk & Abele, 2014). Moreover, we investigated the relationship between CPC and work engagement and burnout at the same time point because we assume that the current perceptions of competition in the work environment affect a person's work motivation and energy more than past perceptions of competition. Cronbach's alphas of all measures within our sample can be seen in Table 1. All included scales exhibited sufficient internal consistency, with Cronbach alphas ranging from 0.76 to 0.93 (Nunnally, Bernstein, & Berge, 1967).

1.5.2.1. Competitive psychological climate. We used a recognized and valid scale by Fletcher et al. (2008). This scale measures the individual psychological experience of a competitive climate at work. A sample item is "The amount of recognition you get in this company depends on how you perform compared to others". The German language version used here showed similar psychometric properties compared to the English language version (Keller, Spurk, Baumeler, & Hirschi, 2016).

1.5.2.2. Leader-member exchange. We employed the German version (Schyns & Collani, 2002) of the highly recommended seven-item LMX 7 scale (Graen & Uhl-Bien, 1995). Gerstner and Day (1997) showed the meta-analytical evidence that the LMX 7 provides the soundest psychometric properties, and the highest correlations with outcomes, compared to all other available instruments. A sample item is "My supervisor understands my problems and needs".

1.5.2.3. Work engagement. Work engagement was measured with a German version of the short version of the Utrecht Work Engagement Scale (Schaufeli, Bakker, & Salanova, 2006), which measures vigor, absorption, and dedication toward one's work. Different language versions can be downloaded from www.schaufeli.com. Sample items are "At my job, I feel strong and vigorous" (vigor); "When I am working, I forget everything else around me" (absorption); or "My job inspires me" (dedication). Previous research frequently applied a composite score of this scale when investigating work engagement as a general construct (e.g., Sonnentag, 2003).

1.5.2.4. Burnout. Burnout was measured using a German version of the Oldenburg Burnout Inventory (OLBI, Demerouti, Bakker, Vardakou, & Kantas, 2003; Reis, Xanthopoulou, & Tsaousis, 2015). The questionnaire assessed two aspects of burnout: disengagement (8 items) and exhaustion (8 items). Sample items are "I frequently talk about my work in a negative way" (disengagement) and "After my work, I regularly feel worn out and weary" (exhaustion). In the present study, we used the composite score to represent burnout in its entire breadth (for similar composite score approaches cf. Gajewski, Boden, Freude, Potter, & Falkenstein, 2017; Westwood, Morison, Allt, & Holmes, 2017). The OLBI generally showed high levels of construct validity (Halbesleben & Demerouti, 2005) and is widely used as an instrument for the measurement of burnout (e.g., Allen, Bryant, & Vardaman, 2010; Polman, Borkoles, & Nicholls, 2010).

Table 1
Descriptive statistics, intercorrelations, and Cronbach's alphas (Study 1).

	Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Gender T1	–	–	–													
2	Grade point average (GPA) T1	1.42	0.38	−0.04	–												
3	Doctoral degree T1	–	–	−0.03	−0.12**	–											
4	Contractual working hours/week T1	34.29	8.49	−0.15***	0.04	−0.39***	–										
5	Occupational tenure in years T1	5.74	3.78	−0.06	0.00	−0.41***	0.21***	–									
6	Neuroticism T1	2.51	1.09	0.24***	−0.08*	−0.03	−0.03	−0.03	0.76								
7	Competitive psychological climate T1	2.81	1.14	0.00	0.02	0.02	0.05	−0.06	0.11**	0.79							
8	Leader-member exchange T1	4.23	1.03	−0.05	−0.05	0.10*	0.06	0.00	−0.21***	−0.12**	0.89						
9	Work engagement T1	4.33	0.93	0.03	−0.05	0.09*	0.01	0.10**	−0.20***	0.00	0.32***	0.93					
10	Burnout T1	2.93	0.73	0.03	0.02	−0.15***	−0.02	−0.10*	0.22***	0.16***	−0.32***	−0.63***	0.85				
11	Number of publications (OCS) T1	0.00	1.21	−0.06	0.00	0.24***	0.13***	0.19***	−0.04	0.12	−0.03	0.13**	−0.06	–			
12	Number of publications (OCS) T2	0.00	5.59	−0.15***	−0.04	0.31***	0.15**	0.38***	−0.07	0.17**	0.04	0.20***	−0.09	0.56***	–		
13	Career satisfaction (SCS) T2	4.37	0.95	0.01	−0.21***	0.07	0.06	−0.06	−0.15***	−0.07	0.22***	0.29***	−0.29***	0.04	0.04	0.85	
14	Trait competitiveness T2	3.33	1.03	−0.06	0.02	−0.06	0.09	−0.06	−0.06	0.21***	0.09	0.15**	−0.09	0.01	0.05	0.15**	0.77

Note. $N = 808$; values in diagonal are Cronbach's alphas; gender (0 = *male*, 1 = *female*), doctoral degree (0 = *no*, 1 = *yes*); OCS = objective career success; SCS = subjective career success.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$

1.5.2.5. Objective career success: number of scientific publications. We assessed objective career success using the self-reported number of scientific publications. Publications are deemed good indicators of objective career success in academic science (Baruch & Hall, 2004; Zacher et al., 2019). Specifically, the number of scientific publications included peer-reviewed journal articles, books or book chapters for academic publishers, and peer-reviewed conference proceedings in paper style.[1] To make the measure comparable between different research fields (there are considerable different publication requirements and standards between fields), we standardized the scientific publications using group-mean centering (the group being one of the broader research fields of mathematics, information technology, natural sciences, technical sciences, social sciences, humanities, economics, or other). In the first step, we calculated a mean value for all eight groups based on the individual values of the participants. In the second step, we have calculated the standardized number of scientific publications by subtracting the corresponding group-mean value from the individual value of the person. Therefore, the average number of publications is zero (see Table 1).

1.5.2.6. Subjective career success: career satisfaction. Career satisfaction was measured with a German version (Spurk, Abele, & Volmer, 2011) of the five-item career satisfaction scale developed by Greenhaus et al. (1990). A sample item is "I am satisfied with the success I have achieved in my career".

1.5.2.7. Control variables. We included gender (0 = *male*, 1 = *female*), grade point average (GPA) of university studies, doctoral degree (0 = *no*, 1 = *yes*), contractual working hours per week (open format), and occupational tenure in months as control variables. We recalculated the monthly variable into a yearly variable (with decimals) for reasons of a more intuitive understanding of the descriptive statistics. Additionally, we included objective career success (i.e., the number of scientific publications), measured at T1, as an autoregressor of the number of scientific publications at T2 because past success achievements might affect CPC, the LMX relationship (young scholar as high potential), and future publications. Moreover, we included trait competitiveness at T2.[2] Trait competitiveness was measured with four items (Brown et al., 1998). A sample item is: "I enjoy working in situations involving competition with others". This measure used a 7-point rating scale ranging from 1 = *totally disagree* to 7 = *totally agree*. Moreover, we included neuroticism which was measured at T1 with two items of the German version of the Ten-Item Personality Inventory (i.e., TIPI-G; Muck, Hell, & Gosling, 2007). TIPI-G uses a 7-point Likert-type scale ranging from 1 (disagree strongly) to 7 (agree strongly). A sample item is "I consider myself as anxious, easily upset". We included these variables as controls because they are assumed to be related to the experience of competition at work (Fletcher et al., 2008; Jones et al., 2017; Spurk et al., 2019b), to both mediators (Alarcon, 2011; Halbesleben, 2010; Purvanova & Muros, 2010), and to career success (Ng et al., 2005; Spurk et al., 2019a). Hence, by controlling for these theoretically relevant variables, we rule out alternative explanations whilst testing the model.

1.6. Results

1.6.1. Preliminary results: discrimination between the study constructs

We conducted confirmatory factor analyses to test a measurement model showing that the central study variables assessed by psychological scales (CPC, LMX, both mediators, and subjective career success) are distinct, using Mplus Version 8.1 (Muthén & Muthén, 1998-2017). We evaluated the model fit based on different model fit indices: comparative fit index (CFI; Kline, 2011), standardized root mean square residual (SRMR; Hu & Bentler, 1998), and the root mean square error of approximation (RMSEA; Kline, 2011). Models with CFI values greater than 0.95 (CFI $\geq$ 0.90 acceptable fit) and RMSEA and SRMR values less than 0.08 indicate a good model fit (Hu & Bentler, 1998; Schreiber, 2017). We compared Model 1 with six latent factors (i.e., competitive psychological climate, LMX, work engagement, burnout disengagement, burnout exhaustion, and subjective career success) with Model 2 where all items of all scales loaded on one general factor. A model comparison showed that Model 2 (χ^2 [764] = 2163.10, $p < 0.001$; CFI = 0.90, SRMR = 0.067, RMSEA = 0.048) was preferable over the poor fitting Model 2 ($\Delta\chi^2 = 4422.14$, $\Delta df = 15$, $p < 0.001$, ΔCFI = 0.32). The results are suggesting that the scales applied here measure different constructs, and that they can be applied within further analyses.

1.6.2. Preliminary results: bivariate relationships

Table 1 summarizes the means, standard deviations, and correlations among the controls and the central study variables. The correlations between the controls and study variables showed that men reported more publications than did women ($r = -0.15$, $p < 0.01$). GPA correlated negatively with career satisfaction ($r = -0.21$ $p < 0.001$), meaning worse grades are related to lower career satisfaction. Researchers without a PhD showed lower LMX levels ($r = 0.10$, $p < 0.05$), lower work engagement ($r = 0.09$, $p < 0.05$), and higher burnout levels ($r = -0.15$, $p < 0.001$). Occupational tenure correlated positively with work engagement ($r = 0.10$, $p < 0.01$)

[1] We decided not applying a weighting procedure by type of publication because it seemed as a cognitive complex and error prone procedure to (a) measure types of publications separately and (b) weighting them by any importance factor that also might vary by field or even discipline (and was not objectively available to the research team). Importantly, previous research showed that the self-reported number of publications generally accurately reflects the actual number publications so that the self-reported number of publications correlated 0.84 and 0.97 with entries in databases (Centra, 1983). In a recent study, Zou et al. (2018) reported a near-perfect correlation ($r = 0.99$, $p < 0.001$) between the self-reported number of publications and the CV-reported number of publications. Overall, those findings suggest that self-reports have high validity when measuring the number of publications.

[2] The trait competitiveness measure was only available at T2. However, as trait competitiveness is a relatively stable dispositional trait, the inclusion at T2 is appropriate. Within Study 2, we measured trait competitiveness at the same time as the predictors.

and negatively with burnout ($r = -0.10$, $p < 0.05$). Furthermore, CPC was positively related to burnout ($r = 0.16$, $p < 0.001$) and number of publications at T2 ($r = 0.17$, $p < 0.01$), was slightly negatively related to LMX ($r = -0.12$, $p < 0.01$), and was unrelated to work engagement ($r = 0.00$, *ns*). Trait competitiveness showed a positive relationship with CPC ($r = 0.21$, $p < 0.01$), work engagement ($r = 0.15$, $p < 0.01$), and career satisfaction ($r = 0.15$, $p < 0.01$), but was not related to the number of publications ($r = 0.05$, ns). Additionally, neuroticism was positively correlated with CPC ($r = 0.11$, $p < 0.01$) and burnout ($r = 0.22$, $p < 0.001$), and negatively correlated with LMX ($r = -0.21$, $p < 0.001$), work engagement ($r = -0.20$, $p < 0.001$), and career satisfaction ($r = -0.15$, $p < 0.001$).

1.6.3. Path modeling results

We used Mplus (Version 8.1, Muthén & Muthén, 1998-2017) to estimate the hypothesized manifest path model, as pictured in theoretical Fig. 1. Moreover, we modeled additional paths within our model: We modeled direct effects of LMX on objective and subjective career success (cf. Fig. 2) because it seems plausible that LMX as a resource has per se positive effects on career success (Spurk et al., 2019a). Furthermore, as recommended in moderated regression analysis (Cohen, Cohen, West, & Aiken, 2013), we centered the exogenous variables (i.e., CPC and LMX) before they were entered within the analysis, and defined low LMX values as one standard deviation below the mean, and high LMX values as one standard deviation above the mean. Correlations between all exogenous manifest variables (e.g., CPC, LMX, controls, and autoregressor of objective career success) were allowed. Finally, we correlated both mediators and both career success outcome variables because these concepts should also be related to each other. Regarding the moderated indirect effects assumptions, as recommended (Shrout & Bolger, 2002), we applied a bootstrapping procedure, with 10,000 sample draws. The results of the model can be seen in Fig. 2 (χ^2 [2] = 0.799, CFI = 1.00, RMSEA = 0.000, SRMR = 0.003).

1.6.3.1. Moderating effects of LMX on the relationship between CPC and work engagement and burnout. We first investigated the interaction effects of CPC and LMX on both mediators because these are the essential parts in the model for detecting the assumed moderated indirect effects. As can be seen in Fig. 2, CPC was not significantly ($\beta = 0.07$, *ns*) and LMX was positively ($\beta = 0.29$, $p < 0.001$) related to work engagement. Furthermore, CPC was positively ($\beta = 0.10$, $p < 0.01$) and LMX was negatively ($\beta = -0.27$, $p < 0.001$) related to burnout. The interaction effects between CPC and LMX were significant, and in the opposite direction when predicting work engagement ($\beta = 0.08$, $p < 0.05$) and burnout ($\beta = -0.06$, $p < 0.05$).

The nature of the interaction effects can be seen in Figs. 3 and 4. The relationship between CPC and work engagement was positive for employees with a high LMX level ($b = 0.12$, $p < 0.05$), but not statistically significant for employees with a low LMX level ($b = 0.00$, $p > 0.05$). Furthermore, the relationship between CPC and burnout was positive under the condition of a low LMX level ($b = 0.11$, $p < 0.01$), but not statistically significant for a high LMX level ($b = 0.03$, $p > 0.05$).

1.6.3.2. The motivation-enhancing path to higher levels of career success via work engagement under high LMX levels. The unstandardized conditional indirect effects of CPC on the number of publications and career satisfaction can be seen in Table 2. In support of Hypothesis 1, CPC was positively related to the number of publications (objective career success) via work engagement under conditions of high (see Table 2, $effect_{high} = 0.10$, $CI_{95\%} = [0.016, 0.260]$) and medium LMX levels ($effect_{medium} = 0.05$, $CI_{95\%} = [0.001, 0.151]$). By contrast, the indirect effect of CPC on the number of publications was not significant at a low LMX level ($effect_{low} = -0.003$, $CI_{95\%} = [-0.107, 0.086]$). The index of moderated mediation, which indicates if the indirect effects at high and low LMX levels differ significantly from each other, was also significant (0.081, $CI_{95\%} = [0.006, 0.185]$).

Furthermore, CPC was positively related to career satisfaction (subjective career success) via work engagement under conditions of a high LMX level (see Table 2, $effect_{high} = 0.02$, $CI_{95\%} = [0.001, 0.045]$). By contrast, the indirect effect of CPC on career satisfaction via work engagement was not significant at medium ($effect_{medium} = 0.01$, $CI_{95\%} = [0.000, 0.027]$) and low LMX levels ($effect_{low} = 0.00$, $CI_{95\%} = [-0.019, 0.016]$). The index of moderated mediation was also significant (0.012, $CI_{95\%} = [0.001, 0.027]$), supporting Hypothesis 2.

1.6.3.3. The energy-decreasing path to lower levels of career success via burnout under low LMX levels. Hypothesis 3 received no support because CPC was not related to the number of publications (objective career success) via burnout under conditions of a low LMX level ($effect_{low} = 0.04$, $CI_{95\%} = [-0.027, 0.163]$), nor under any other LMX condition. The non-support of Hypothesis 3 is largely due to a not statistically significant, direct effect of burnout on the number of publications (see Fig. 2; $\beta = 0.05$, *ns*). Consequently, the index of moderated mediation was also not statistically significant.

However, CPC was negatively related to career satisfaction (subjective career success) via burnout under conditions of low (see Table 2, $effect_{low} = -0.02$, $CI_{95\%} = [-0.052, -0.003]$) and medium LMX levels ($effect_{medium} = -0.013$, $CI_{95\%} = [-0.035, -0.002]$). By contrast, the indirect effect of CPC on career satisfaction via burnout was not significant at a high LMX level ($effect_{high} = -0.006$, $CI_{95\%} = [-0.028, 0.007]$). The index of moderated mediation was also significant (−0.010, $CI_{95\%} = [-0.001, -0.021]$), supporting Hypothesis 4.[3] Altogether, the model in Fig. 2 explained 44% of the variance within the number of publications, and 19% of the variance in career satisfaction.

[3] We also compared models where the indirect effects at different LMX levels were freely estimated with models where the indirect effects at different LMX levels were hold equal. In all cases where the index of moderated mediation was significant, the freely estimated models showed a better model fit compared to the model with equal paths, providing further support for Hypotheses 1, 2, and 4.

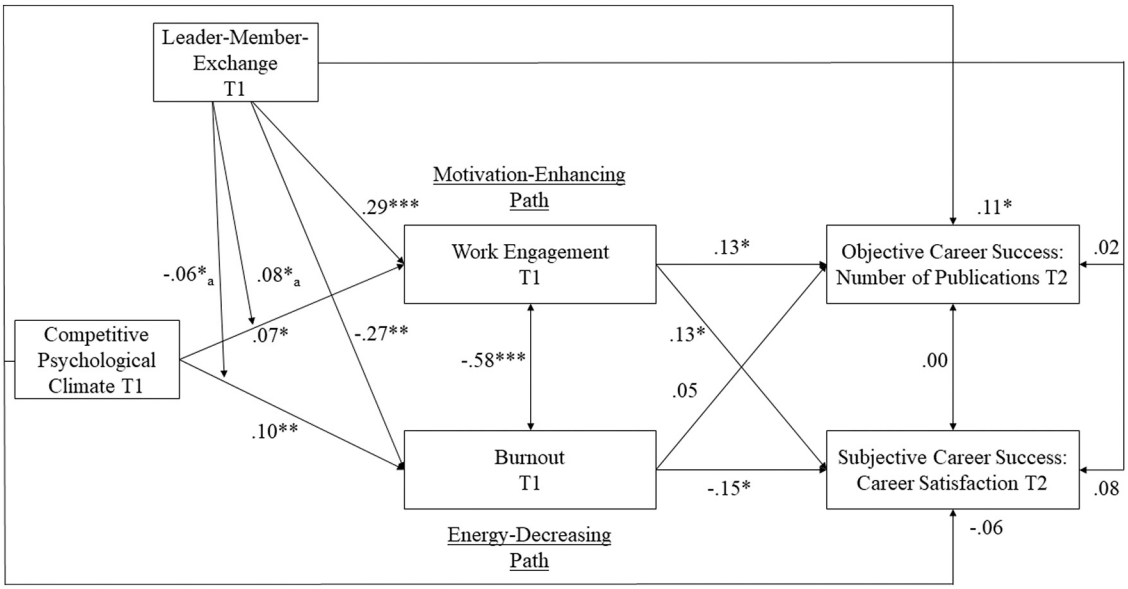

Fig. 2. Results of the moderated indirect effects dual process model (Study 1).
Note. $N = 808$; $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Standardized path estimates are reported. The model includes all control variables. Effects of controls are not displayed. a = interaction effect competitive psychological climate * LMX.

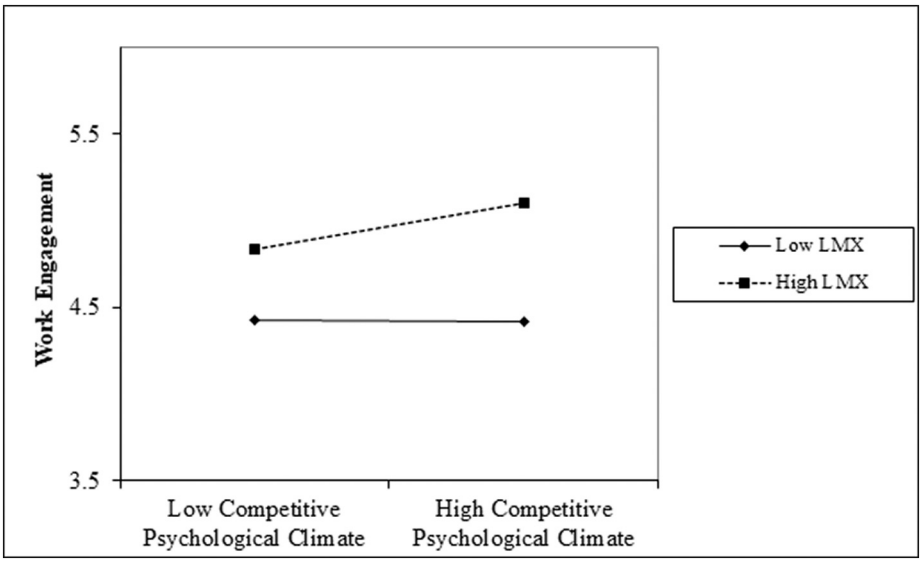

Fig. 3. Interaction plot of the relationship between competitive psychological climate and work engagement at different levels of leader-member exchange (Study 1).
Note. LMX = Leader-Member Exchange, low LMX level = −1SD, high LMX level = +1SD.

2. Study 2

The aim of Study 2 was to provide further evidence for the underlying assumptions of transactional stress theory from Hypothesis 1 to 4. Specifically, we tested the following additional hypotheses:

Hypothesis 5. CPC is positively related to work engagement via challenge appraisals of CPC under conditions of high LMX.

Hypothesis 6. CPC is positively related to burnout via hindrance appraisals of CPC under conditions of low LMX.

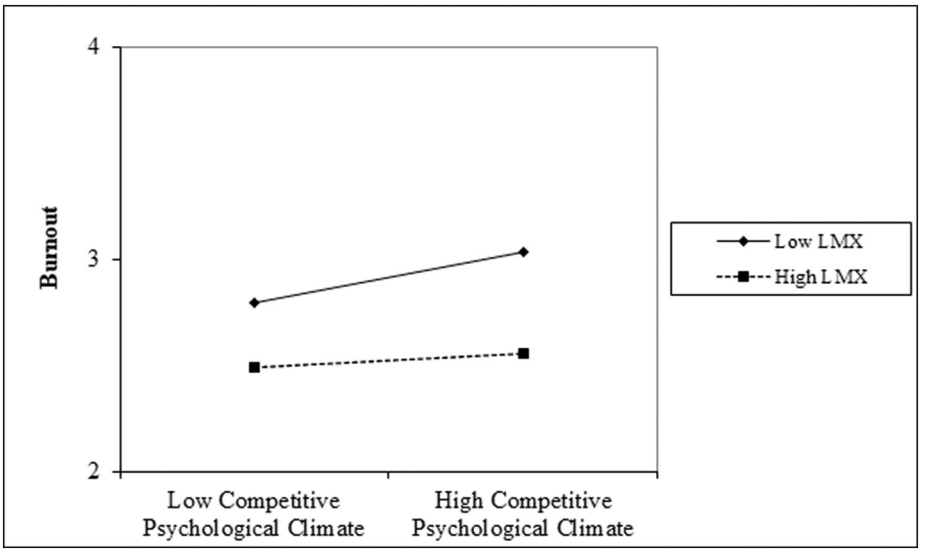

Fig. 4. Interaction plot of the relationship between competitive psychological climate and burnout at different levels of leader-member exchange (Study 1).
Note. LMX = Leader-Member Exchange, low LMX level = −1SD, high LMX level = +1SD.

Table 2
Unstandardized conditional indirect effects of competitive psychological climate on career success (Study 1).

	Indirect effect	Boot LLCI	Boot ULCI
Conditional indirect effects of competitive psychological climate on career success via *work engagement as a function of leader-member exchange*			
Objective career success			
Low LMX	−0.003	−0.107	0.086
Medium LMX	0.046*	0.001	0.151
High LMX	0.095**	0.016	0.260
Subjective career success			
Low LMX	0.000	−0.019	0.016
Medium LMX	0.008	0.000	0.027
High LMX	0.016*	0.001	0.045
Conditional indirect effects of competitive psychological climate on career success via *burnout as a function of leader-member exchange*			
Objective career success			
Low LMX	0.041	−0.027	0.163
Medium LMX	0.026	−0.016	0.107
High LMX	0.011	−0.014	0.101
Subjective career success			
Low LMX	−0.020*	−0.052	−0.003
Medium LMX	−0.013*	−0.035	−0.002
High LMX	−0.006	−0.028	0.007

Note. $N = 808$; Boot = bootstrapping; LLCI = Lower level 95% confidence interval; ULCI = Upper level 95% confidence interval.
* $p < 0.05$.
** $p < 0.01$.

2.1. Method

2.1.1. Sample and procedure

Participants were recruited through an online access research panel company within Germany. The sample consisted of academic employees who took part in an online survey in spring 2020. Participants had to fulfill various preconditions: (1) aged between 25 and 45 years (similar to Study 1), (2) academics (i.e., university and/or college education; degrees such as Bachelor, Master etc., similar to Study 1), (3) employed in the private industry in Germany, and (4) working for a minimum of 16 h per week, in order to assure that work had a certain importance within the life of the participants (similar to Study 1). We decided not to collect academic scientists within universities but academics within the private industry to also investigate if the results of Study 1 are generalizable to another working population. All participants received small incentives for their participation. None of the participants earned money with online surveys professionally (e.g., full-time gig workers).

From 417 reached employees, 102 were screened out (e.g., because they did not fulfill the preconditions, as for example, they were

self-employed). Of the 315 employees admitted, 280 answered the questionnaire completely. During a careful data cleaning process, which accounted, for example, for speeding and carelessness (DeSimone, Harms, & DeSimone, 2015), further 31 participants were excluded, resulting in a sample size of 249 employees. The final data set contained no missing data.

Within the final sample (52.6% female, 47.4% male; age: $M = 36.07$, $SD = 5.36$), 6.4% participants held a doctoral degree. Participants graduated in different fields (e.g., computer sciences, economics, educational sciences) and worked in diverse jobs (e.g., as controller, project manager, pharmacist, researcher) and were employees from different industrial sectors (e.g., educational system, healthcare sector, IT). The mean occupational tenure of the participants was 10.69 years ($SD = 6.21$).

2.1.2. Measures

All variables were measured by means of a standardized questionnaire. Measures used a 6-point rating scale ranging from 1 = *totally disagree* to 6 = *totally agree*. Cronbach's alphas of all multi-item measures within our sample can be seen in Table 3. All included scales exhibited sufficient internal consistency, with Cronbach alphas ranging from 0.84 to 0.96 (Nunnally et al., 1967). We measured CPC, LMX, work engagement, and burnout with the same scales as in Study 1.

2.1.2.1. Challenge and hindrance appraisals of competitive psychological climate. We developed two new Likert-type scales to assess challenge and hindrance appraisals of competitive psychological climate (for a comparable procedure see Bakker & Sanz-Vergel, 2013). We presented each of the four items of the competitive climate scale as developed by Fletcher et al. (2008) separately in order to investigate how challenging (12 items) and hindering (12 items) participants thought these work aspects were. As in the original scale (Bakker & Sanz-Vergel, 2013), we asked participants how 'challenging', 'nice', and 'motivating' they find these four competition statements (i.e., challenge appraisal). For example, participants had to evaluate how 'challenging', 'nice', and 'motivating' they experience that "The amount of recognition you get in this company depends on how you perform compared to others". Furthermore, participants also indicated how 'hindering', 'demanding', and 'difficult' they find the four statements about competition (i.e., hindrance appraisal). We conducted an EFA with Promax rotation and free factor numbers with the 24 items. This EFA clearly revealed two independent factors that were, as in the original article (Bakker & Sanz-Vergel, 2013), negatively correlated, providing support for the construct validity of these scales.

2.1.2.2. Control variables. We controlled for the same variables (despite neuroticism) as in Study 1. All controls were measured in the same way as in Study 1.

2.2. Results

2.2.1. Preliminary results: discrimination between competitive psychological climate and challenge and hindrance appraisals of competitive psychological climate

We conducted several confirmatory factor analyses using Mplus Version 8.4 (Muthén & Muthén, 1998-2017) and evaluated the model fit based on different model fit indices (cf. Study 1; Hu & Bentler, 1998; Kline, 2011). The theoretically expected models where the CPC items and the appraisal items loaded on different factors showed a good model fit. Furthermore, the results of the model comparisons suggest that the three scales applied here measure different constructs, and can be applied within further analyses. The model fit indices and model comparisons can be seen in Table S2 in the supplemental material.[4]

2.2.2. Preliminary results: bivariate relationships

Table 3 summarizes the means, standard deviations, and correlations among the controls and the central study variables.

2.2.3. Path modeling results

We used PROCESS (Hayes, 2018, Version 3.4) within IBM SPSS Version 25 to test the first-stage conditional indirect effect (Model 7; cf. Hypotheses 5 and 6). As recommended in moderated regression analysis (Cohen et al., 2013), we centered the exogenous variables (i.e., CPC and LMX) before they were entered within the analysis and defined low LMX values as one standard deviation below the mean, and high LMX values as one standard deviation above the mean. As recommended(Shrout & Bolger, 2002), we applied a bootstrapping procedure with 10,000 sample draws. We controlled for the following variables within the models: gender, GPA, doctoral degree, contractual working hours per week, occupational tenure, and trait competitiveness. Furthermore, both effects of challenge and hindrance appraisals on the outcomes (i.e., work engagement or burnout) were considered conjointly in the models. In other words, potential effects of challenge appraisals on work engagement are independent of hindrance appraisals, and potential effects of hindrance appraisals on burnout are independent of challenge appraisals. In sum, this procedure was fully comparable to Study 1.

[4] We also conducted confirmatory factor analyses to show that the central study variables (without control variables) assessed by psychological scales (CPC, LMX, challenge appraisals of CPC, hindrance appraisals of CPC, work engagement, and burnout) are distinct. The results were similar to Study 1, showing that the central study variables are in fact empirically distinct.

Table 3
Descriptive statistics, intercorrelations, and Cronbach's alphas (Study 2).

	Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1	Gender	–	–	–											
2	Grade point average (GPA)	1.99	0.66	−0.14*	–										
3	Doctoral degree	–	–	−0.08	−0.01	–									
4	Contractual working hours/week	37.47	5.16	−0.29***	0.03	0.03	–								
5	Occupational tenure in years	10.69	6.21	−0.16*	0.16*	0.03	0.04	–							
6	Competitive psychological climate	3.07	1.17	−0.11	0.03	0.16**	0.14*	−0.01	0.84						
7	Challenge appraisals of CPC	3.31	1.05	−0.20**	0.05	0.12	0.07	0.04	0.38***	0.94					
8	Hindrance appraisals of CPC	3.30	1.15	0.12	0.09	−0.09	−0.05	−0.10	0.13*	−0.26***	0.94				
9	Leader-member exchange	3.92	1.13	−0.15*	0.01	0.09	0.00	0.05	0.09	0.26***	−0.15*	0.93			
10	Work engagement	3.94	1.14	−0.07	−0.05	−0.01	−0.12	0.12	0.04	0.42***	−0.17**	0.55***	0.96		
11	Burnout	3.07	0.82	0.03	0.03	−0.02	0.13*	−0.12	0.27***	−0.18***	0.25***	−0.53***	−0.69***	0.88	
12	Trait competitiveness	4.20	1.35	−0.14*	−0.02	0.15*	0.08	−0.00	0.40***	0.62***	−0.16*	0.10	0.32***	−0.08	0.88

Note. $N = 249$; CPC = competitive psychological climate; values in diagonal are Cronbach's alphas; gender (0 = *male*, 1 = *female*), doctoral degree (0 = *no*, 1 = *yes*).
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

2.2.4. Moderating effects of LMX on the relationship between CPC and challenge and hindrance appraisals of CPC

On average, CPC was positively related to challenge appraisals ($\beta = 0.14, p < 0.01$) and to hindrance appraisals ($\beta = 0.18, p < 0.01$). Moreover, the interactions between CPC and LMX were significant, and in the opposite direction when predicting challenge ($\beta = 0.10$, $p < 0.01$) and hindrance appraisals ($\beta = -0.12$, $p < 0.05$). The nature of the interaction effect can be seen in Figs. 5 and 6. The relationship between CPC and challenge appraisals was positive for employees with high LMX ($b = 0.26$, $p < 0.001$), but not statistically significant for low LMX ($b = 0.03$, $p > 0.05$). Furthermore, the relationship between CPC and hindrance appraisals was positive under the condition of low LMX ($b = 0.32$, $p < 0.001$), but not statistically significant for high LMX ($b = 0.05$, $p > 0.05$).

2.2.5. The motivation-enhancing path to higher levels of work engagement via challenge appraisals of CPC under high LMX levels

The unstandardized conditional indirect effects of CPC on work engagement can be seen in Table 4. In support of Hypothesis 5, under conditions of a high LMX level, CPC was positively related with work engagement via challenge appraisals of CPC (see Table 4, $effect_{high} = 0.109$, $CI_{95\%} = [0.050, 0.181]$). By contrast, the indirect effect of CPC on work engagement was not significant at a low LMX level ($effect_{low} = 0.012$, $CI_{95\%} = [-0.045, 0.086]$). The index of moderated mediation was also significant (0.043, CI95% = [0.007, 0.084]).

2.2.6. The energy-decreasing path to higher levels of burnout via hindrance appraisals of CPC under low LMX levels

The unstandardized conditional indirect effects of CPC on burnout can be seen in Table 4. Under conditions of a low LMX level, CPC was positively related with burnout via hindrance appraisals of CPC (see Table 4, $effect_{high} = 0.033$, CI95% = [0.001, 0.078]). By contrast, the indirect effect of CPC on burnout was not statistically significant at a high LMX level ($effect_{low} = 0.005$, CI95% = [−0.015, 0.030]). The index of moderated mediation was also significant (-0.014, $CI_{95\%} = [-0.001, -0.036]$), supporting Hypothesis 6.

3. General discussion

The aim of this study was to investigate two different processes of CPC at work that might either foster or hamper career success. Specifically, integrating reasoning from CPC research into transactional stress theory and the JD-R model, the results of Study 1 showed that CPC is positively related to objective and subjective career success via work engagement (motivation-enhancing path and CPC appraised as challenge) under conditions of a high LMX quality relationship (supporting Hypotheses 1 and 2). Furthermore, the results showed that CPC is negatively related to subjective career success via burnout (energy-decreasing path and CPC appraised as a hindrance) under conditions of a low LMX quality relationship (supporting Hypothesis 4). These results were robust after considering several control variables that might have been an alternative explanation for the investigated relationships (i.e., gender, GPA, doctoral degree, contractual working hours per week, occupational tenure in years, prior objective career success, trait competitiveness, and neuroticism). Furthermore, within Study 2, the underlying assumptions were tested in more detail. Specifically, by operationalizing challenge and hindrance appraisals of CPC, the results of Study 2 showed that the interpretation of CPC as challenging (e.g., motivating, nice) or hindering (e.g., goal blocking, difficult) is dependent on the LMX level (see Hypothesis 5 and 6). Altogether, Study 1 and Study 2 provide implications for career development as well as CPC related stress research.

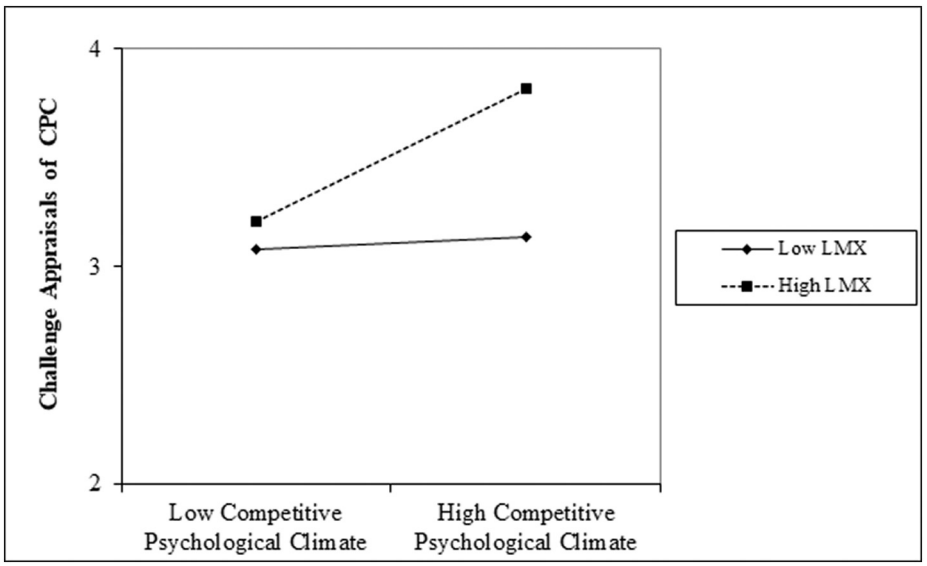

Fig. 5. Interaction plot of the relationship between competitive psychological climate and challenge appraisals of competitive psychological climate at different levels of leader-member exchange (Study 2).
Note. CPC = Competitive psychological climate, LMX = Leader-Member Exchange, low LMX level = −1SD, high LMX level = +1SD.

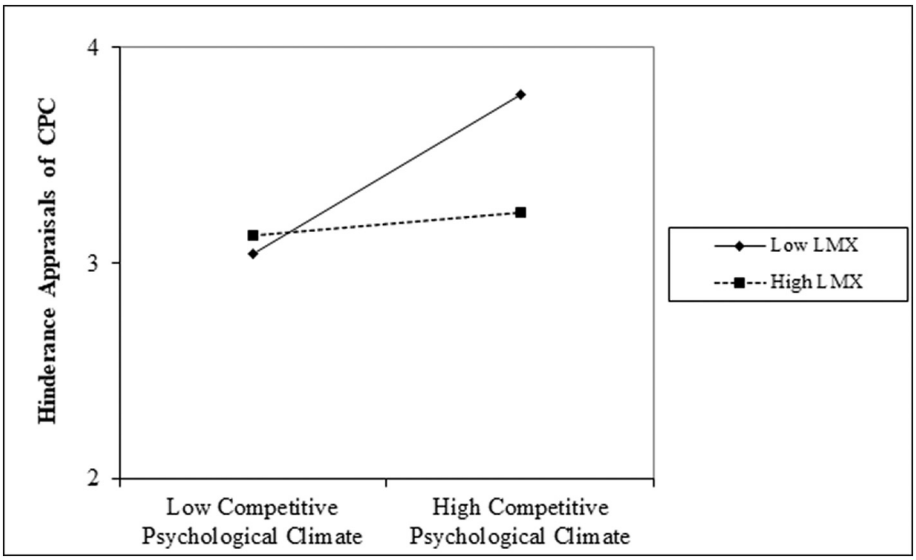

Fig. 6. Interaction plot of the relationship between competitive psychological climate and hindrance appraisals of competitive psychological climate at different levels of leader-member exchange (Study 2).
Note. CPC = Competitive psychological climate, LMX = Leader-Member Exchange, low LMX level = −1SD, high LMX level = +1SD.

Table 4
Conditional indirect effects of competitive psychological climate on work engagement and burnout (Study 2).

	Indirect effect	Boot LLCI	Boot ULCI
Effects of competitive psychological climate on work engagement via *challenge appraisals*			
Low LMX	0.012	−0.045	0.086
Medium LMX	0.060*	0.020	0.116
High LMX	0.109*	0.050	0.181
Effects of competitive psychological climate on burnout via *hindrance appraisals*			
Low LMX	0.033*	0.001	0.078
Medium LMX	0.019	0.000	0.048
High LMX	0.005	−0.015	0.030

Note. $N = 249$; LMX = Leader-Member Exchange; Boot = bootstrapping; LLCI = Lower level 95% confidence interval; ULCI = Upper level 95% confidence interval.
* $p < 0.05$.

3.1. Implications for career development

High levels of competition represent one aspect of changing labor markets, organizations, and career systems. Moreover, individuals are more frequently confronted with this competition in their career development (e.g., Connelly et al., 2014; Fletcher et al., 2008; Spurk et al., 2019b). Consequentially, knowledge about how different appraisals of CPC, work engagement, and burnout affect career success is crucial for a more detailed understanding of successful career development. Although research has begun to more directly operationalize different competition-related variables for the explanation of career success (Connelly et al., 2014; O'Neill & O'Reilly, 2010; Spurk et al., 2019b), in comparison to other predictors of career success (e.g., Big Five, social capital, career management behaviors), we know little about how and why CPC affects career success.

For example, a recent study by Spurk et al. (2019b) suggests that CPC is only related to objective career success (e.g., salary) and subjective career success (e.g., career satisfaction) under conditions of high trait competitiveness. The current study extends such findings by showing that not only person-related but also context-related boundary conditions affect the CPC-career success relationship and its explaining mechanisms. Such a differentiated analysis of competing perspectives (motivation-enhancing versus energy-decreasing pathways) for predicting career success adds to recent calls to more explicitly compare different possible pathways to career success, instead of solely testing main effects or mediations with the same direction (Spurk et al., 2019a).

We tested the main model (Study 1) within a large sample of young scientists from Germany. Overall, the employment situation of these employees is characterized by competitive, volatile, and uncertain career paths and work environments (Baruch & Hall, 2004; Zacher et al., 2019), making the topic important and ecologically valid within the study population. Moreover, we considered the nature of this specific sample by the selection of measures. For example, we decided to measure the number of publications as an indicator of objective career success because other criteria, such as salary (Ng et al., 2005; Spurk et al., 2019a) are not very meaningful.

Specifically, in a sample of young scientists salary is variance-restricted (Baruch & Hall, 2004; Judge et al., 2004; Zacher et al., 2019) because the salary is primarily dependent on public contracts that are about the same for every PhD student and postdoc. Nonetheless, the current results provide some concrete ideas of how career success in terms of the number of publications of young scientists is affected by CPC, work engagement, burnout, and LMX.

In contrast, career satisfaction as an indicator of subjective career success is a meaningful measure across several occupations and career paths (Spurk et al., 2015), and thereby also for academic scientists. Moreover, work engagement and burnout as general constructs about work motivation and energy are meaningful, and independent of the occupation or working field (Alarcon, 2011; Demerouti & Bakker, 2008; Halbesleben, 2010). Moreover, by testing the relationships of CPC, related appraisals, LMX, work engagement, and burnout within another sample of employees working in the private industry in Germany (see Study 2), there exists evidence that the relationships of CPC and the mediators are independent of the sample and can be generalized to a broader population.

We also observed one unexpected finding in Study 1. The energy-decreasing path from CPC via burnout under low LMX levels was not supported for objective career success (Hypothesis 3) because burnout was not related to the number of publications. A closer look at the correlations also shows that only work engagement but not burnout is related to objective career success. A possible explanation might be that individuals try to compensate for an energy loss due to burnout with the aim to perform at still high enough levels to reach career success (Demerouti et al., 2001). Therefore, it might be that the effects of burnout on objective outcomes are not that clearly visible than on subjective outcomes.

Interestingly, the number of publications was not related to career satisfaction for young scientists. Although this seems surprising, because meta-analyses usually identify small to moderate correlations between objective and subjective career success (Ng et al., 2005), some research also suggests that both career success dimensions can be independent of each other (Rodrigues & Guest, 2010). It might be that the number of publications would be positively related to perceived career success (Turban & Dougherty, 1994) or other-referent subjective career success (Abele, Spurk, & Volmer, 2011) because in those subjective indicators the comparison with a peer group (which is visible with the numbers of publications) is central. In contrast, career satisfaction is more referring to individual self-set standards and hence might on average not be linked to the number of publications (Spurk et al., 2011).

3.2. *Implications for CPC and stress research*

Besides providing implications for career development, the results also add knowledge to previous research on CPC as a potential stressor in the work domain. Although previous research has mentioned beneficial and maladaptive effects of CPC on individual and organizational outcomes (Fletcher et al., 2008; Keller et al., 2016; Kohn, 1999), these studies did not integrate CPC within recent research on transactional stress theory (Lazarus & Folkman, 1984; Webster et al., 2011) or the JD-R model (Bakker & Demerouti, 2017; Demerouti et al., 2001). Compared to other studies that already investigated effects of one stressor (e.g., role ambiguity) via two different pathways, namely challenge and hindrance appraisals (Skinner & Brewer, 2002; Webster et al., 2010; Webster et al., 2011), our study additionally investigated the conditions under which one stressor can lead to challenge versus hindrance appraisals or to higher versus lower levels of the same outcome (here, career success). As a specific contribution, within Study 2, we adopted a challenge and hindrance appraisal measure (Bakker & Sanz-Vergel, 2013) to the context of CPC. Thereby, we meaningfully expanded the understanding of CPC as a stressor in the workplace and showed that people evaluate perceived competition in the workplace differently. Overall, when interpreting the bivariate relationships in the main study, the results are highly similar compared to past studies on challenge–hindrance appraisals related to one stressor (Horan et al., 2020). CPC was positively related to the number of publications (CPC appraised as a challenge), and at the same time, positively related to burnout (CPC appraised as a hindrance). Moreover, within Study 2, CPC was positively related to both challenge and hindrance appraisals, suggesting that it can even be perceived as both challenging and hindering. In sum, these results point toward a theoretical framework (i.e., challenge versus hindrance appraisals) under which diverse and potentially opposite CPC effects can be studied within future vocational and organizational research. Hence, we directly contributed to recent calls that research should (a) measure stress-related appraisals more directly and (b) investigate reasons why individuals experience the environment either as challenging or hindering (Horan et al., 2020; O'Brien & Beehr, 2019).

On a more critical note, past meta-analytical research on challenge and hindrance demands/stressors found that challenge demands/stressors (e.g., responsibility or workload) were positively related to both work engagement *and* burnout (Crawford et al., 2010). Taking this logic, one might argue that CPC as a potential challenge stressor might also be positively related to burnout under high LMX levels. However, the mentioned meta-analysis categorized different variables as either challenge (e.g., responsibility or workload) or hindrance demands (e.g., role conflicts, emotional conflicts) and assumed that the majority of the workforce reacts to those demands in a similar manner. However, those assumptions are not fully in line with transactional stress theory, which highlights the individualized and diverse nature of related appraisals. In contrast to Crawford et al. (2010), the model in the present article assumes different (conditional) effects from one not beforehand as challenging or hindering classified stressor (CPC) on different outcomes. Moreover, we applied a more neutral understanding of a stressor that potentially leads to strain in case of hindering appraisals. Similar to the present article under the condition of high LMX levels, Webster et al. (2011) showed that challenge appraisals were unrelated to burnout. Another recent study found that challenge appraisals related to the stressors of time urgency, role conflict, and emotional demands were negatively related to burnout (Li et al., 2020). Besides the conceptual differences between the studies that investigate challenge/hindrance stressors versus appraisals, another reason for the differences between those studies might be on the methodological side. The response format of the often-used scale to measure challenge and hindrance stressors (Cavanaugh, Boswell, Roehling, & Boudreau, 2000) ranges from 1 (*produces no stress*) to 5 (*produces a great deal of stress*). However, incorporating the

term "stress" in the response format of the stressor measure can create inflated correlations with strain measures (Jex, Beehr, & Roberts, 1992). In contrast, appraisal measures usually do not refer to the term "stress" within the response format. Although a highly interesting topic for future research, it is beyond the scope of this article to go into more detail here.

3.3. Practical implications

These results have further practical implications for the management of academic science careers. Research institutes should discuss if and why a competitive environment/climate might be fostering or hampering for individual productivity and career development (De Vos & Cambré, 2017; Fletcher et al., 2008; Ogbonnaya & Valizade, 2018). The results of our study suggest that scientific reward systems or career systems that are related to CPC (e.g., performance evaluations or promotability suggestions of supervisors based on comparisons with others, or frequent and salient work quality, and status comparisons among coworkers) should not be applied without considering boundary conditions. A blindfold application of systems that are solely based on competition or related perceptions might lead to downsides (e.g., health problems, such as burnout, as shown here) and upsides (higher productivity, as shown here), and scientific managers and leaders should be aware under which conditions which effects occur. Our study suggests that professors or other academic leaders should be trained or sensitized that perceived competitive systems might only be beneficial if they develop a good LMX relationship with their research team members. Moreover, employees should be aware that a good LMX relationship might canalize perceptions about competition in a motivating and beneficial way. Importantly, a recent study showed that the LMX relationship can be actively and intentionally shaped, for example, via a job crafting intervention (van den Heuvel et al., 2015). Finally, although Study 2 suggests that the effects of CPC on challenge and hindrance appraisals, work engagement, and burnout can be replicated within a sample from the private industry, future research needs to investigate the practical implications of the study results for general HRM outside academic science careers.

3.4. Limitations and future research

One limitation of our study is that the data might suffer from common method bias (Podsakoff, MacKenzie, & Podsakoff, 2012). However, we separated the predictors and outcome measures over time to reduce this problem. Although previous research showed that CPC is a proxy for the more objective work climate (Fletcher et al., 2008; Parker et al., 2003), besides self-ratings, the competitive climate could be measured via team ratings within future research. Related to this, as other research has done (Centra, 1983; Zou, Tsui, & Peterson, 2018), we measured the number of scientific publications as self-reported overall quantity. Although previous research showed a high validity of such self-reports (Centra, 1983; Zou et al., 2018), future research could measure more objective metrics like retrieving the number of publications from scientific databases. However, within the current study, it was not possible due to data protection reasons to connect objective data with the survey data. Additionally, although the overall number of publications is surely an important criterion for successful academic science careers, high impact publications or quality of the publications is also an important criterion that should be considered in future research.

Second, as already discussed, we used a relatively homogenous sample of young academic scientists in Study 1. On the one hand, such an approach has the advantage of being able to include specific measures (e.g., the number of publications for objective career success). On the other hand, it might be that variance among some study variables (e.g., burnout) was restricted within this relatively homogenous sample, and therefore some of the assumed relationships (e.g., the effect of burnout on the number of publications) could not be detected. Hence, the results should not be generalized without caution to other samples outside academic science careers and especially to employees in late career stages (we here researched samples of a maximum age of 45 years).

Third, as the project was a larger project on career development, and for reasons of space restrictions, we could not measure all variables repeatedly (except for publications as a central outcome in academic science careers) and thereby could not test for stability effects in career satisfaction. Although more results that include other stability effects (besides the number of publications) would be interesting in terms of robustness, the study does not focus on any change processes within the conceptual model. It would be interesting for future research to investigate more change-related aspects of the here investigated processes.

Fourth, although we tested a complex model with two mediators and one moderator, as well as an additional model that included stressor appraisals, it might well be that other moderators or mediators are relevant when investigating the effects of CPC on workplace outcomes. Previous research has already shown that especially trait competitiveness (Fletcher et al., 2008; Spurk et al., 2019b) or goal orientations (Jones et al., 2017) are further important moderators. However, the here presented studies suggest that especially moderators and mediators related to challenge and hindrance processes are helpful for explaining the diverse effects of CPC. Hence, future studies might investigate even in more detail which cognitions, feelings, and coping styles explain the relationship between CPC and both work engagement and burnout and other workplace outcomes.

3.5. Conclusion

The two studies aimed to shed light on the competing assumptions of how perceived competition at the workplace relates to successful or unsuccessful career development. By integrating CPC research within transactional stress theory and the JD-R model the study showed that the LMX quality, as a central contextual workplace factor, is crucial to understand the CPC–career success and CPC–challenge versus hindrance appraisal relationship. The results suggest that competition and related perceptions might foster the career success of young scientists, but can also have hampering side effects under unfavorable contextual working conditions (i.e., low LMX).

CRediT authorship contribution statement

Daniel Spurk: Conceptualization, Writing – original draft, Formal analysis, Data curation. **Annabelle Hofer:** Conceptualization, Writing – original draft, Formal analysis. **Simone Kauffeld:** Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors whose names are listed on the title page certify that they have no affilliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

Appendix A. Supplementary data

Supplementary material to this article can be found online at https://doi.org/10.1016/j.jvb.2021.103542.

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